Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Interaction of a highly flexible cantilever beam with grid-generated turbulent flow. OLEG GOUSHCHA, Manhattan College, YIANNIS ANDREOPOULOS, The City College of New York — Experiments have been performed to study the fluid-structure interaction of a flexible cantilever beam with the free end facing upstream in anisotropic turbulent flow. Velocity fluctuations in the wind tunnel flow were generated by a turbulence grid. Time-Resolved Particle Image Velocimetry (TR-PIV) techniques were used to acquire velocity data on the plane of a CW laser illumination. Forces exerted on the beam were estimated based on the PIV data by analytically solving the Pressure Poisson Equation (PPE). Two types of interaction were observed. At a lower Reynolds number, fluid forces excite the beam into oscillations of small magnitude. At higher Reynolds number, the excitation is stronger, deflecting the beam sufficiently to cause flow separation and vortex shedding on one side of the beam. The resultant vortices exert additional forces on the beam producing large magnitude oscillations of the beam.

Oleg Goushcha
Manhattan College

Date submitted: 03 Aug 2016 Electronic form version 1.4